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# SmartGate™ Update 2018

The World's Longest-running Face-Based Automated  
Border Crossing (ABC) System

**James L. Wayman, John Bowes and Joshua Abraham**  
**Contractors, Department of Home Affairs, Government of**  
**Australia**

# Usual and not-so-Usual Caveats

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- John, Josh and Jim are scientific contractors to the Department of Home Affairs. They do not speak for the Department.
- Any deviation from any past or future statements by Home Affairs indicates a misunderstanding on our part.
- The name “SmartGate” is trademarked by the Department of Home Affairs
- SmartGate has changed our thinking about biometrics
  - Biometrics without “enrollment”
  - Thresholds do not control FNMR
  - ABC systems can be cost effective
  - Much more than pattern recognition technology

# Support for Efficient Border Crossing

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- Obviously, border security
- But also

Tourism drives Australia's trade in services

- Tourism accounted for half of all services exports in 2015-2016.
- International visitors collectively consumed \$34.2 billion worth of goods and services in Australia.
- Education-related travel services...\$19.9 billion -- Trade Minister Media Release 2017

# No Compromise on Passenger Privacy Allowable

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- High priority given the privacy of all travelers, whether or not they use SmartGate
- SmartGate uses the data stored on the smart chip embedded in the ePassport. This data is exactly the same data that is on the bio-data page of each passport (i.e., name, date of birth, passport number...)
- No data is written by SmartGate to the passport or passport chip. Passports are not stamped.
- Passenger movement data is only disclosed as allowed under Australia law, whether or not the passenger has an ePassport or uses SmartGate.
- SmartGate complies with all aspects of the Privacy Act 1988
  - Only obtain data required to process passengers and aircrew across the border
  - Store data securely and accurately
  - Use or disclose the data only for the purpose for which it was collected or as otherwise required or authorized by law
- The Office of the Federal Privacy Commissioner has assumed an active involvement in the SmartGate Program from inception

# Where We are Today

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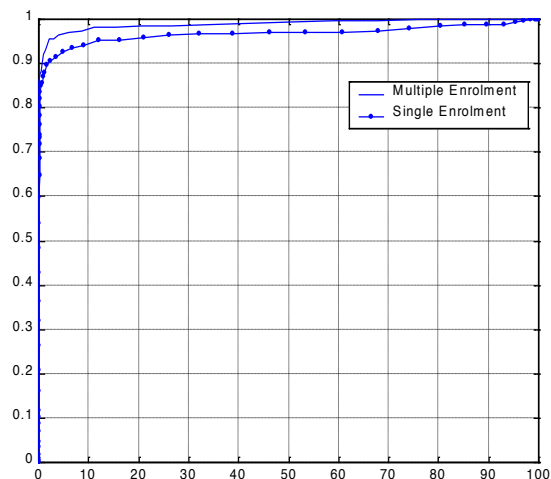
AUD \$96.3 million project from 2015–2020

## Passenger Volumes

	2015-2016	2016-2017	2017-2018
Travellers (inc.crew)	40.7 million	43.7 million	46.0 million
SmartGate clearances	14.9 million	24.2 million	26.0 million

# Where We Started 2003

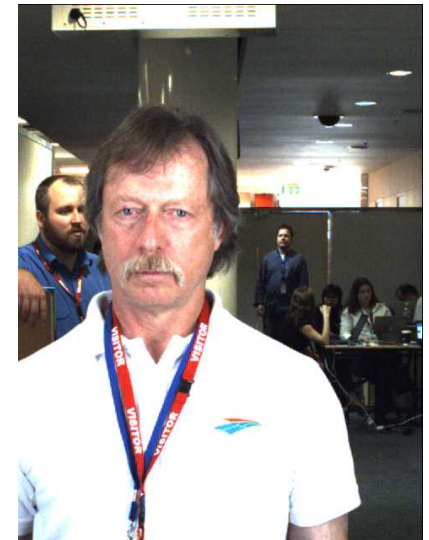
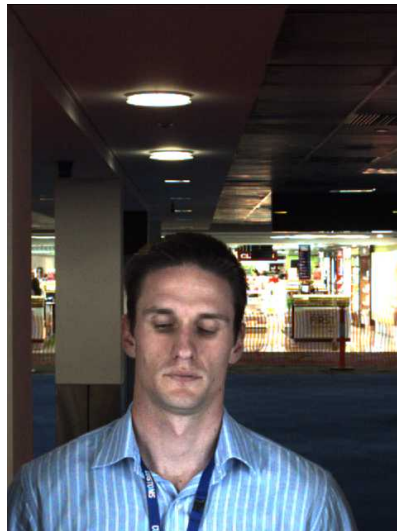
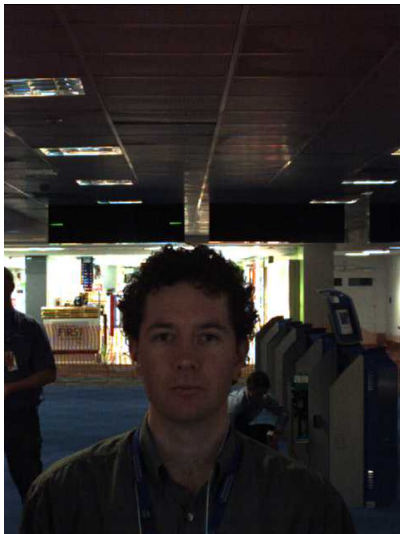
- Arrivals Only
- Qantas Aircrew
- 5 photo enrollment
- 92.1% verification rate  
@1%FMR



# Challenges of the Airport Environment

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- Airport lighting and signage controlled by airport owner
- Collections cannot be “ICAO compliant”
- AU passports photos currently submitted by applicants
- Passengers expecting different process
- Ongoing human factors development



# Three Versions of SmartGate Now Operating

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- Differing Concepts of Operations
  - Differing passenger demographics
  - Differing designs and algorithms
  - Differing performance stats
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1. Arrivals 2007 “Series One”
  2. Arrivals Upgrade now piloted at CBR
  3. Departures since 2016



# “Series One” Two-Step Arrivals Process: Kiosk and Gate

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Step 1



Step 2

# Facts and Figures: Arrivals

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- Arrivals SmartGate (Series 1) commenced Aug 2007 (Brisbane Airport)
- FY 2017-2018: 10.3 million inbound passengers (7% FY increase)
- Age restrictions:
  - citizen or non-citizen aged 16 years or older, or
  - an Australian citizen aged 10 to 15 years old and travelling with at least two adults
- Eligible passports:
  - Canada - China
  - France - Hong Kong
  - Ireland - Japan
  - Korea - Macau
  - New Zealand - Singapore
  - Sweden - Switzerland
  - Taiwan - United Kingdom
  - United States of America
- 79% of all inbound travellers were SmartGate eligible; 57% used SmartGate

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# Major arrivals SmartGate upgrade now being piloted at Canberra International Airport

# Departures SmartGate

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27 November, 2018

# Departures SmartGate

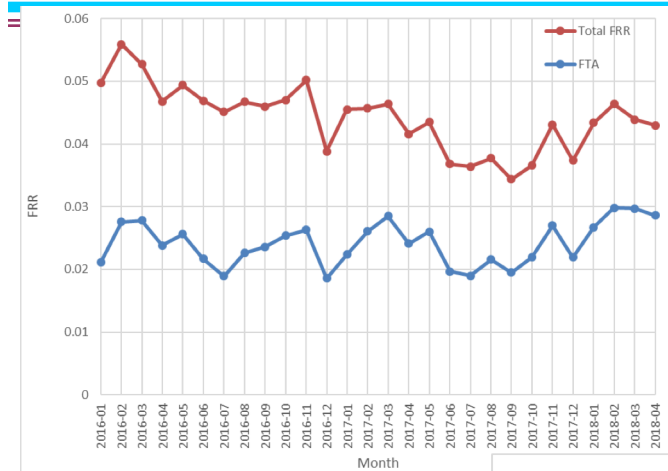
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- Available for all travelers, regardless of age or passport
- Families processed at Assisted Processing Gates
- Installed at all major international airports in 2015
- Two step process at the gate
- Both chip and print image are captured
  - Non e-Passport holders always referred to primary processing
- 3 customs officers for 6 gates
  - Clearance
  - Escort
  - Primary line
- 110+ travelers processed per hour

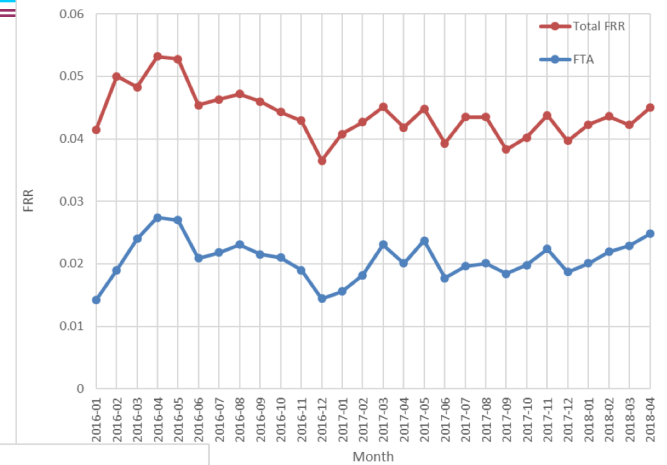


# Biometric Referrals: Departures

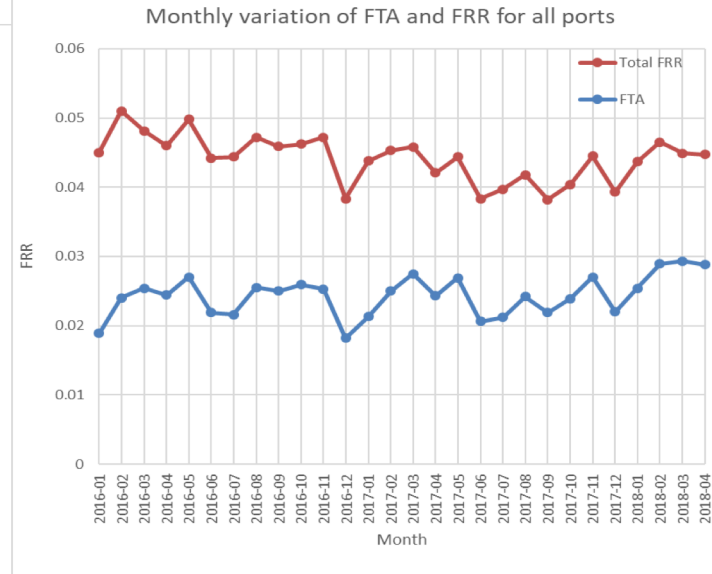
## (monthly '16- '18)



airport 1



airport 2

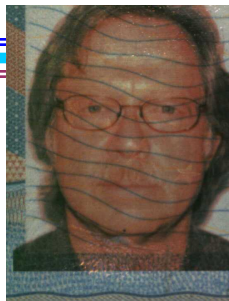


27 November, 2018

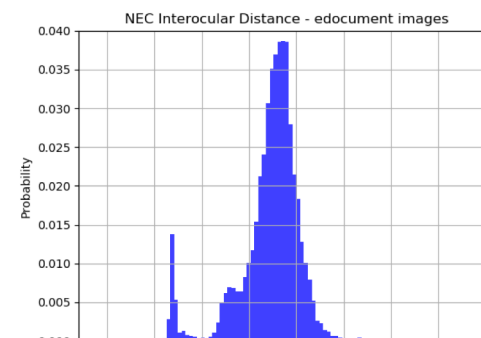
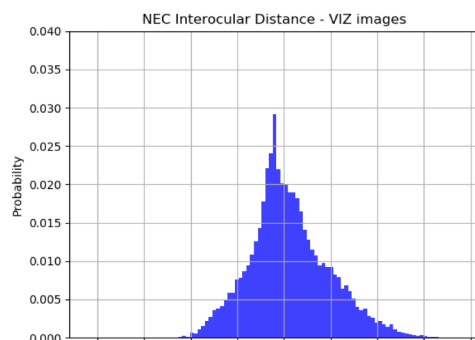
All

# Non-ePassport VIZ vs Chip Images

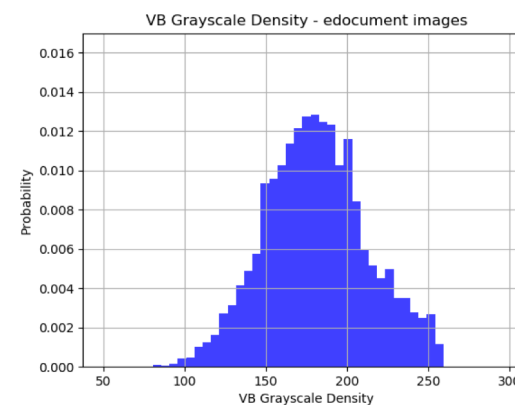
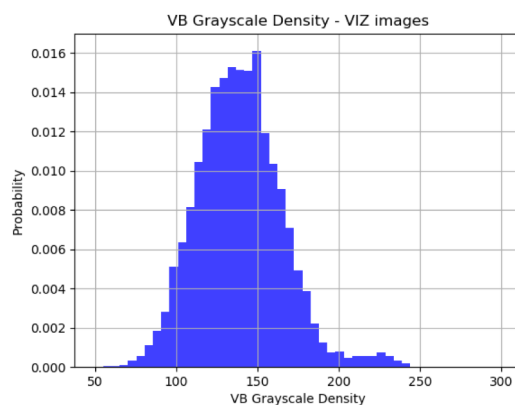
VIZ



Chip



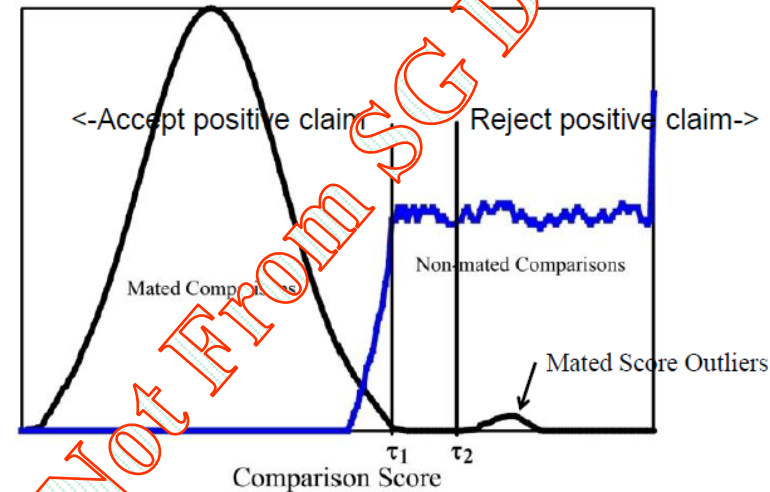
Interpupil  
Pixels



Gray-Scale  
Histogram

# Setting Thresholds

- FMR is strong function of threshold
  - Monotonically increasing
- FNMR is very weak function of threshold
  - Monotonically ~~decreasing~~ non-increasing
- $P(\text{Score}|\text{ground truth})$   
Cannot be inverted
- Thresholds cannot be “optimized”  
Priors and costs cannot be modeled
- Set threshold to meet strategic requirement for zero-effort FMR
- Seek improvement in resulting FNMR through human factors



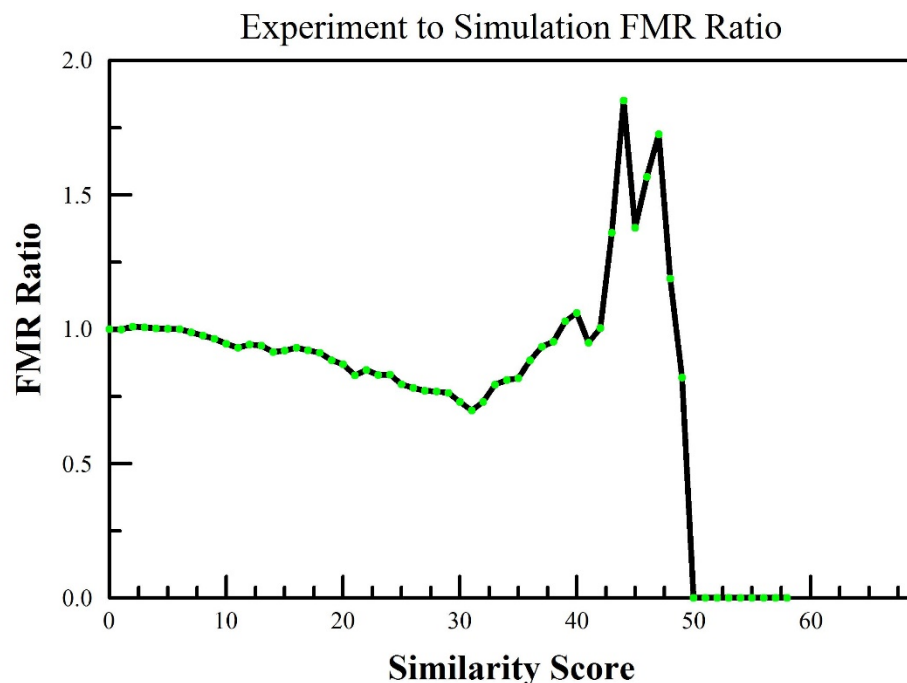


# FMR Testing: “On-line” vs Simulation

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- Experimental FMR
  - 80+ volunteers with 100/2 real ANZ passports
- Simulation FMR
  - Stored passport images and video sequences
- Gate dependent FNMR
  - Are we at algorithmic limit?



# Conclusions

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- SmartGate (Arrivals) has operated successfully as a voluntary system for eligible travelers since 2003 through numerous technology upgrades
- New Arrivals system rolling out now
- SmartGate was expanded in 2015 to welcome all outgoing passengers with 90% contactless processing goal
- Remaining development will focus on human factors in a cross-cultural environment. (The really hard part!)
- We invite you to Australia to experience both SmartGate and Aussie hospitality